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The book, and in particular chapters I., II., VIII., XII. and XIII., may be commended to those who are interested in the development of psychological theory. Almost every page is marked by the touch of the clear thinker, the first-hand observer, and the careful experimenter.

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#### PETROLEUM DEVELOPMENTS IN FOREIGN COUNTRIES

THE worldwide activity in the search for petroleum deposits of commercial importance which characterized the year 1913 continued unabated during the early part of 1914. During the later part of the year development in proved areas was greatly curtailed and exploration work postponed on account of the European war and the enormous overproduction of oil in the United States and Mexico.

John D. Northrop, of the United States Geological Survey, is authority for the following statement discussing the petroleum developments in foreign countries in 1914, which has just been made public by the survey.

##### NORTH AMERICA

*Canada.*—The productive fields of Ontario and New Brunswick continued to furnish the declining petroleum output of the Dominion. Though considerable effort was made to extend the boundaries of the productive areas, new production sufficient to offset the decline in older wells was obtained only in the Belle River field, Ontario. Good gas wells continue to be found in the Tilbury district, Ontario, but attempts to retard the declining oil output were unsuccessful.

Wildcat activity, with apparently undue interest centered in the vicinity of Calgary, Alberta, was the feature of the year in the western provinces. The discovery of small quantities of high-grade petroleum at depths of 1,562 and 2,700 feet in the Dingman well, southwest of Calgary, created a hysterical rush for mining locations in the area. Drilling was commenced at a number of points southwest and northwest of Calgary and, though proving

the presence of small quantities of heavy oil in certain areas of favorable structure, failed to demonstrate the true extent or value of the field before the end of the year. In northern Alberta the lack of transportation facilities retarded the development of the promising oil strikes of the Athabasca Oils, Ltd., near Fort McKay.

In British Columbia encouraging oil indications in the valley of Flathead River and in the vicinity of Revelstoke, Kootenai County, and at Pitt Meadows, New Westminster County, near Vancouver, resulted in more or less prospect drilling.

In Saskatchewan interest was centered at Moose Jaw, where good oil showings were found, but included additional projects at Regina, Battleford, and Saskatoon and in Souris Valley, where oil seepages occur near Roche Percee.

*Mexico.*—Early in 1914 field operations in the oil districts of Mexico were very active—more so in the northern fields at Panuco and Topila than in the southern fields where the work was interrupted by the belligerent political factions. The bringing in of an enormous gusher by the Corona Oil Co. (Dutch-Shell) at Panuco on January 11 became the signal for a pronounced increase of work in the northern fields, where, as in the southern fields, the lack of adequate storage facilities tended to hamper developments greatly. Work in all districts was abruptly curtailed and in many places terminated by the exodus of operators and workmen beginning in April. Although the subsequent activities of the warring factions resulted in no great damage to the petroleum interests, the resulting conditions of unstable government prevented the resumption of more than nominal activity in the oil fields up to the end of the year. Late in the year the resumption of local oil consumption by the Mexican railroads and mining industries served to revive activity to some extent at Panuco and Topila.

Of more than passing interest was the fire which raged about the famous Potrero del Llano No. 4 well of the Mexican Eagle Oil Co., during the later part of the year. Seepages of

oil escaping to the surface after the well had been capped were ignited by lightning on August 14, and up to the close of the year the fire, though confined to a small area, had defied all efforts to extinguish it.

During the year the Panuco field was extended to the southwest and the Topila field to the west. Wildcatting at Rancho El Chapopote revealed promising indications of an oil field near Campeche, State of Campeche. A four-still topping plant was installed by the Standard Oil Co. at Tampico, and construction work was started by the Tampico & Panuco Valley Tramways Co. on a 25-mile railroad connecting Tampico with the Panuco oil field.

#### CENTRAL AMERICA AND WEST INDIES

Examination of the petroleum indications in Honduras resulted in the formation of the Honduras Oil Co., financed by Honduras capital, which is reported to have obtained concessions in the departments of Atlantida, Yoro and Comayagua.

By legislative decree the government of San Salvador has granted to Alfredo Leon Schlesinger, a native of Austria-Hungary, the exclusive privilege of conducting geologic studies of the mineral resources of San Salvador for one year and of exploiting them for a period of 30 years, subject to a 25 per cent. royalty and to the reversion of all property to the government at the end of the concession period.

Drilling for oil in Cuba continued in the vicinity of Cardenas.

The testing of promising structure and oil indications in Barbados was retarded by the failure of the legislature to enact laws providing for such exploration.

Developments at Trinidad resulted in a marked increase in production over previous years, despite the deterring effects of meager storage facilities, which, together with the influence of the European war, served to greatly curtail operations toward the end of the year.

#### SOUTH AMERICA

*Colombia.*—The discovery of petroleum and natural gas at Tubara, near the important

Caribbean seaport of Barranquilla, indicates the development of an important oil field in close proximity to the Panama Canal.

*Ecuador.*—Investigations of the petroleum indications along the coast and in the mountains near Quito, by a Dutch syndicate, suggest the possible development of Ecuador's petroleum resources in the near future.

*Peru.*—Developments in the proved oil fields of Peru were without notable incident. The production showed a moderate increase during the early part of the year, necessitating the erection of additional tankage at Zorritos.

*Bolivia.*—Geologic investigations in the area between the Incahuasi and Aguaraygua ranges have shown the presence of a considerable area of prospective oil land south of Sucre, and the reported acquisition of petroleum concessions in that region indicates that the area will be thoroughly tested.

*Chile.*—Several companies were organized in Santiago to test certain districts in which surface indications of petroleum have been known for many years.

*Argentina.*—In the Comodoro Rivadavia oil district, in southern Argentina, 5,000 hectares (12,355 acres) of land has been reserved by the government, of which 350 hectares (865 acres) is being exploited by the state. Legislation providing for the exploitation of the petroleum deposits in Comodoro Rivadavia is now under consideration by the Argentine Congress.

*Venezuela.*—Work was continued by the Caribbean Petroleum Co., on the east coast of Lake Maracaibo in the shallow-sand field opened late in 1913.

#### EURASIA

*Russia.*—On Apsheron Peninsula the oil fields in the vicinity of Baku showed a steady decline, development being retarded by a strike of the oil-field workmen which lasted from June 11 to July 31. In spite of the effects of the strike and the immediately succeeding mobilization of the Russian army, which involved a great number of oil-field workers, the production of the Baku fields made sub-

stantial headway during the later part of the year.

At Grosny, in northeastern Caucasus, extensions of productive area yielded a gratifying increase in production. At Maikop production decreased in spite of significant oil strikes in the Khadijenskaia district, northwest of the developed portion of the field.

In the relatively new Ural-Emba or Ural-Caspian area the Dos Sor field attracted the greatest attention, but minor activity was evident in some forty other fields scattered over an area of 300 square miles east of the mouth of Ural River. A refinery at Bolshaia Rakusha, near Guriev, commenced operations in January. On the east side of the Caspian Sea, in the Ferghana Valley, Turkestan, developments in the new Sel-Rokh field resulted early in the year in a production which surpassed that of the old Tchimon district, Turkestan. Developments in Tcheleken Island were nominal.

*Roumania.*—Despite the increasingly active drilling campaign which characterized Roumanian developments in the early part of the year and resulted in notable western and southwestern extensions in the Bana-Moreni district and in the discovery of deeper-lying productive strata in the same area, the net production of the country registered a decline. This decline, which was not in any sense due to the exhaustion of the productive fields, resulted in part from interruptions incident to the mobilization of the Roumanian army but chiefly from the conditions of overproduction arising from restricted markets and low prices consequent on the European war, which involved the countries that bound Roumania on all sides. Notwithstanding these retarding influences the later part of the year recorded slight increases of productive areas in the Baicoi-Febatori and Razvadlaid districts.

*Austria-Hungary.*—In the Galician fields active development early in the year resulted in establishing a southern extension of the Boryslaw field which clearly indicates the ultimate connection of that field with the development at Mraznica. Operations in the oil fields during the later part of the year were much curtailed as the adjacent territory be-

came the theater of conflict between Russian and Austrian troops.

In Hungary the discovery of oil was reported in the village of Morvaor, district of Szenice, Nyitra county.

*Spain.*—Promising surface indications of petroleum in the area about Cadiz, in southern Spain, were examined at the expense of the Spanish government. In northern Spain, near Santander, petroleum in small quantities was discovered in a boring made for salt.

*Turkey.*—Plans for the active development of the imperfectly operated oil fields in the Tigris and Euphrates valleys, in the vicinity of Mosul and Bagdad, were postponed by the European war.

In Palestine prospecting was active at Makarim, in the area between the River Jordan and Deraa adjacent to the Hedjaz Railway, by the Turkish Petroleum Co., a successor in interest to the Syrian Exploration Co.

*Persia.*—Interest in Persian developments was greatly stimulated by the decision of the British government, announced May 22, to acquire a majority interest in the Anglo-Persian Oil Co., and thereby secure for the admiralty undisputed access to valuable oil lands adjacent to the Persian Gulf. The effect of the European war on this agreement was not apparent at the end of the year.

*India.*—Operations in the Yenangyaung, Singu and Yenangat districts, in Burma, were nominal, the search for deeper sands in the first two districts furnishing variable results not altogether satisfactory. Wildcatting in Burma resulted in the opening of a promising new field at Indaw, Kindat Township, in the upper Chindwin district.

*China.*—Under the terms of an agreement entered into by the Chinese government and the Standard Oil Co., of New York, a joint investigation of the petroleum resources in and near Autin-fu, Shensi, Chengte and Chihli was undertaken.

*Japan.*—Interest was centered in the Akita oil district, on the west coast of Nippon, near the north end of the island, where on May 25 and September 1 gushers credited with flows of several thousand barrels daily were brought in by the Nippon Oil Co. In 14 other known oil-

bearing localities in Japan no developments of note were reported.

#### OCEANIA

In Borneo, Sumatra and Java no notable additions to productive area were made. In the northeastern portion of New Guinea (Papua) petroleum deposits were reported near Eitape, and in the southeastern portion of the island oil indications of great promise were found by Australian geologists on the western flank of the Albert Mountains, between the River Purari on the north and Yule Island on the south.

*New Zealand.*—Interest was centered in the Taranaki district, New Plymouth, North Island, where late in the year four wells producing oil simultaneously were believed to indicate the presence of a considerable quantity of oil in the locality. On South Island the Shell interests abandoned a test well at 900 feet on account of the presence of metamorphic slate.

#### AFRICA

*Algeria.*—Work on the test well of the Algerian oil fields at Abd-er-Rahim was suspended in April, 1914, at a reported depth of 902 meters, on account of parted casing. A second test started in March was located at Messila.

*Egypt.*—The activity of the Anglo-Egyptian Oilfields, Ltd., resulted in the completion of a number of creditable wells during the year in the Gamsah and Hurgada fields.

*Somaliland.*—Promising oil indications were found in British Somaliland on the south side of the Gulf of Aden.

#### A STUDY OF THE INFLUENCE OF VOLCANIC DUST VEILS ON CLIMATIC VARIATIONS

THE series of overlapping yearly means of temperature, expressed graphically, show most characteristic crests and depressions. In the case of tropical stations, in particular, the crests of the curves are very regular and recur at intervals of two to three years, practically at the same time all around the world.

As a general result of a detailed study of

the temperature data of the years 1900–1909, for Europe, Greenland and North America, I have found some striking correlations between these equatorial variations and the more complicated variations of temperate and arctic regions. This research has been published recently in the *Annals of the New York Academy*.

In another study of all available temperature data of the years 1891–1900, published some years ago, I have shown that terrestrial atmosphere, at the earth's surface, has been warmer in 1900 than in 1893 by at least 0.5° C. On the maps representing the geographical distribution of the departures of annual means from the quasi-normal values of ten-yearly means, the areas of positive departures have been called thermopleions and the areas covered by negative departures antipleions. On the curves of overlapping means the crests correspond to pleions and the depressions correspond to antipleions. I have presumed that the excess of pleions over antipleions, corresponding to pleionian crests of equatorial stations, may be due to an increase of the solar constant.

Recently, many papers have been published about the influence of volcanic dust on meteorological phenomena, on atmospheric temperature in particular, and it has been admitted by different authors that volcanic dust must have been a factor in the production of past climatic changes.

The hypothesis ascribing the origin of climatic variations to the presence of volcanic dust veils in the higher atmospheric layers, is a very plausible argument against my supposition that the changes in terrestrial temperature are due to cosmical causes. Before going any further in my researches on the mode of formation and the dynamics of pleionian variations, it was therefore necessary to find out to what extent one may be justified to suppose that the antipleionian depressions of temperature are simply caused by the presence of volcanic dust veils.

In a paper read before the New York Academy of Sciences on December 7, I have studied